

**.Characterization of iron impregnated polyacrylamide catalyst and its application to
treatment of municipal wastewater**

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Table S1
Characterization of IIPA compound

S.No.	Parameters	Values
1	Surface Area (m ² /g)	99.66
2	Average pore diameter (Å)	58.32
3	Pore Volume (cm ³ /g)	0.218
4	Carbon (%)	12.23
5	Hydrogen (%)	1.63
6	Nitrogen (%)	2.93
7	Sulphur (%)	0.0554
8	Silicon (%)	15.25
8	Iron (%)	58

Table S2 Bacterial species identification methods

Bacteria	Identification method
Total coliform bacteria	Most Probable Number test
Fecal coliform	Most Probable Number test
HPC(heterotopic plate count)	Nutrient agar
nitrifying bacteria	Nitrifier enrichment medium
denitrifying bacteria	Basal media
E.coli	Eosin methylene agar
Shigella	Salmonella –Shigella agar
Pseudomonas	Pseudomonas isolation agar
Bacillus	Spore staining
Streptococcus	Streptococcus isolation agar + gram staining + Blood agar
Staphylococcus	Mannitol salt agar + coagulase test
Proteus	CLET agar medium

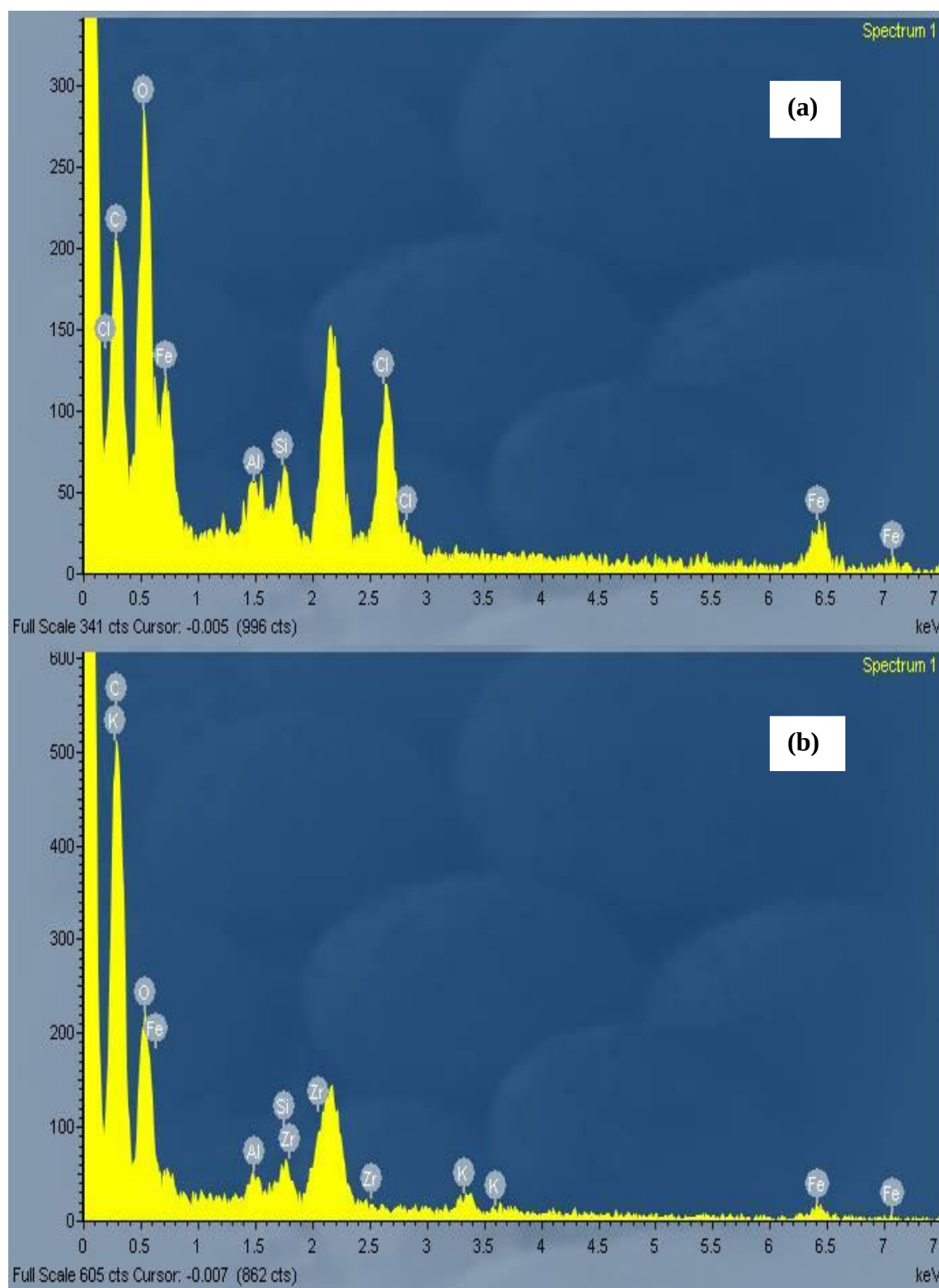


Figure S1. EDX spectra of IIPA compound (a) before and (b) after exposure to the treatment of municipal wastewater

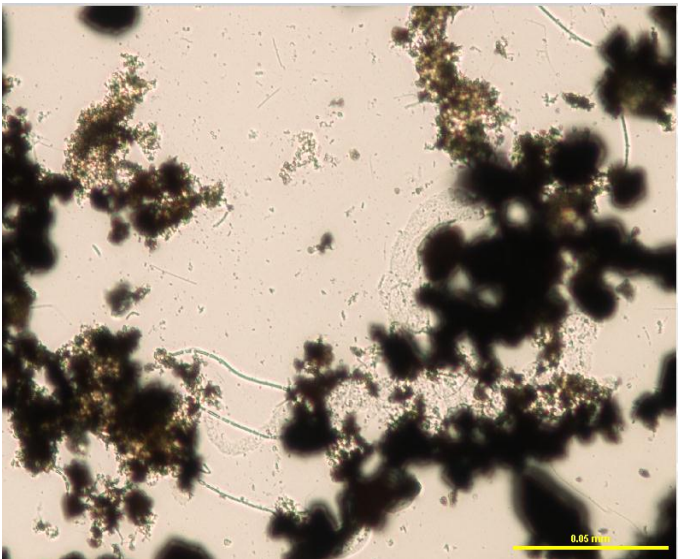
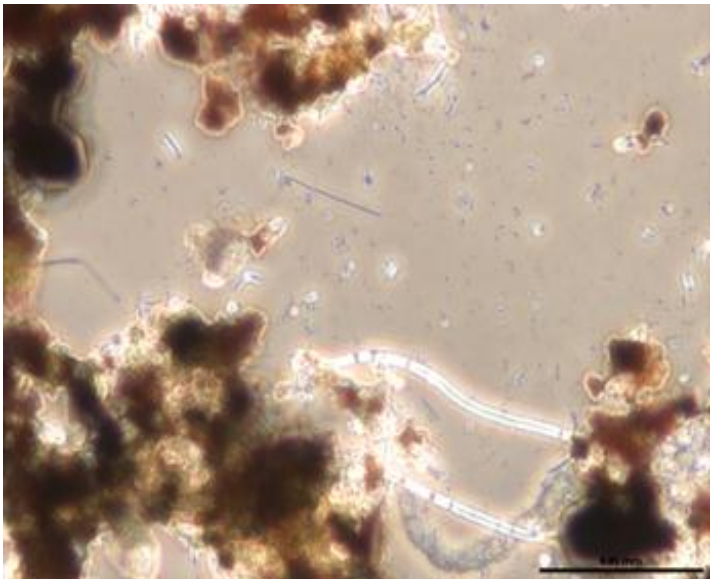
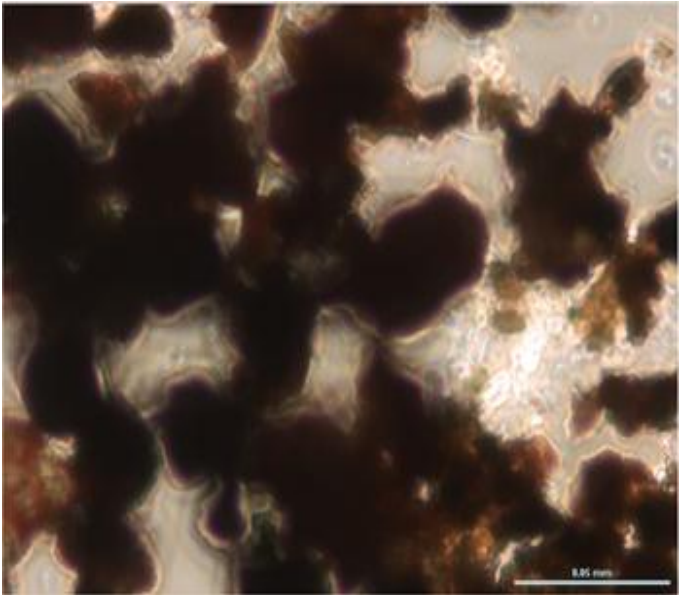
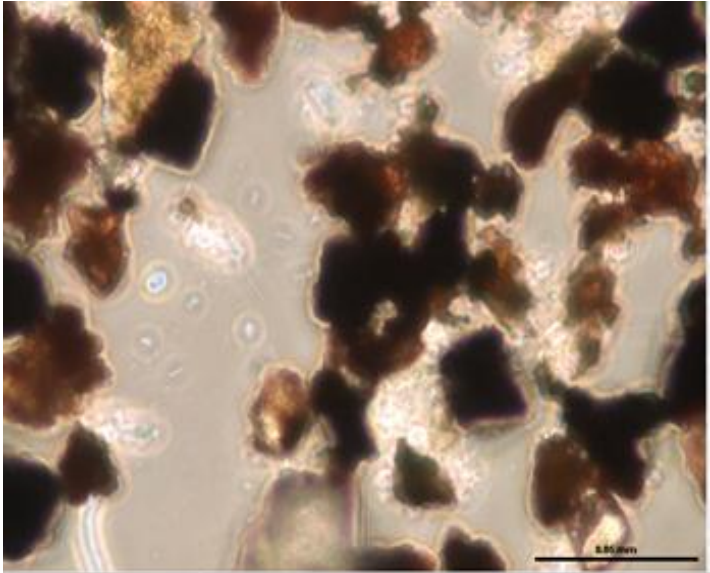
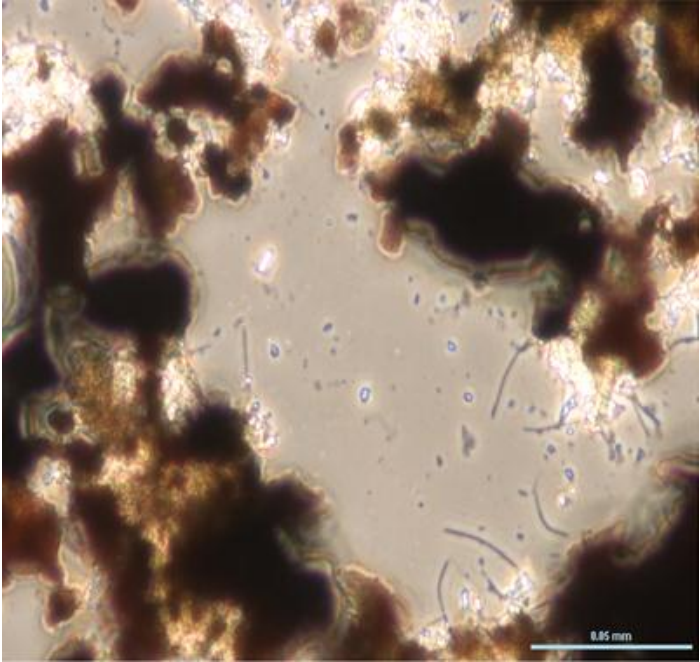
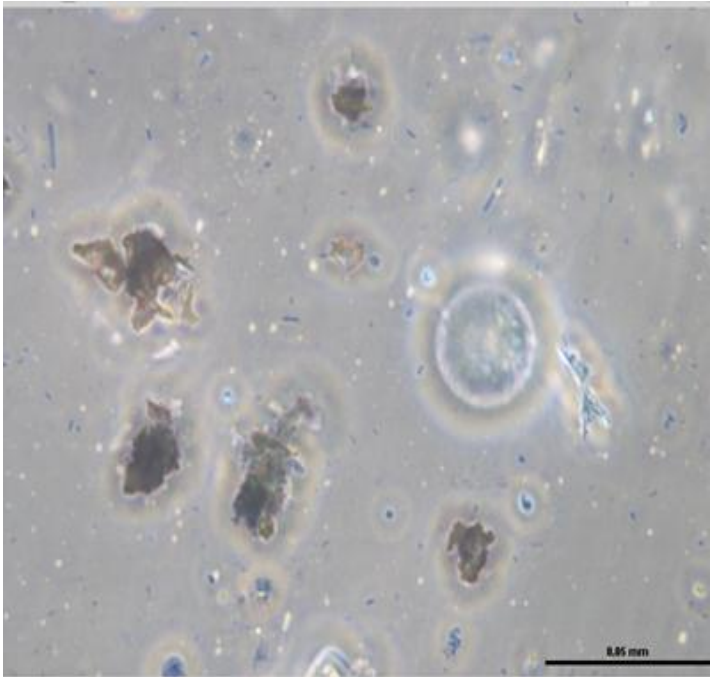


Figure S2. Phase contrast microscopy image of the microbes attached to the IIPA compound during the treatment of wastewater

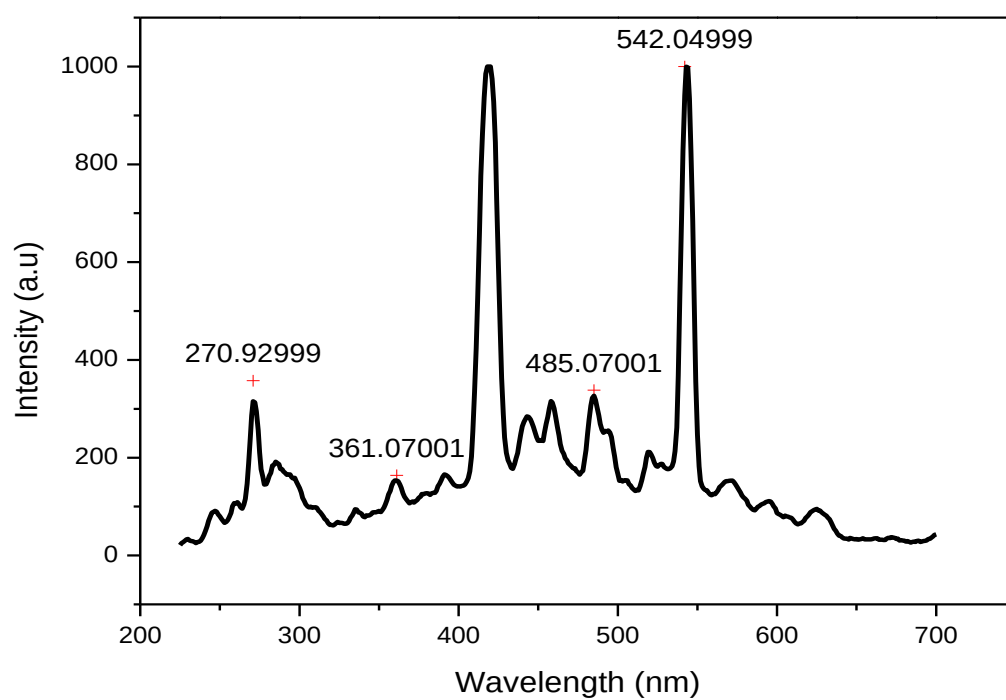


Figure S3. Emission spectra of IIPA compound

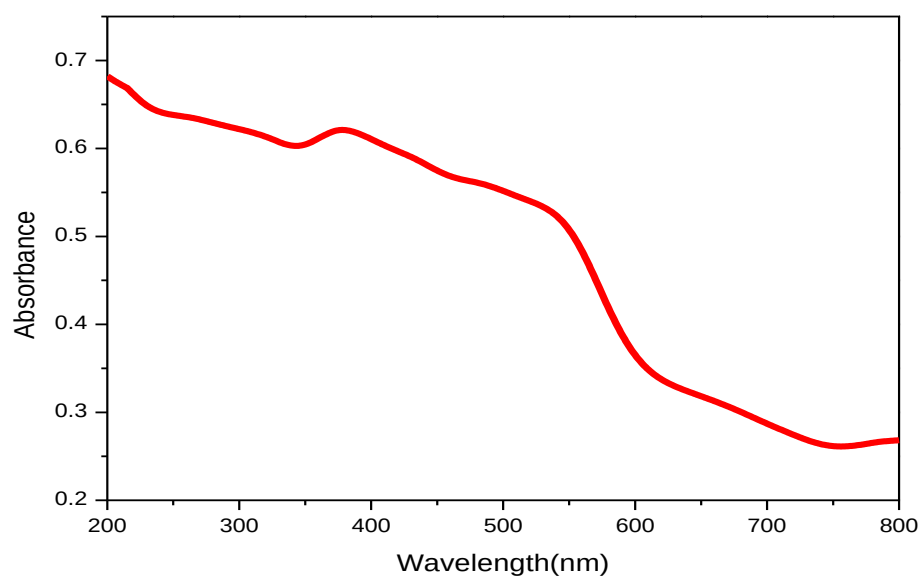


Figure S4. DRS spectra of IIPA compound, indicating the extrinsic semiconductor nature of the catalyst

Table S3
Characteristic of municipal wastewater before and after catalytic oxidation with IIPA
compound

S.No	Parameters	before oxidation	after oxidation
1	pH	6.9-7.2	7.6-7.9
2	Dissolved Oxygen	0.98±2.1	5.6±2.1
3	Chemical Oxygen Demand (COD)	543±56	93±20
4	Biochemical oxygen demand (BOD)	176±32	48±8.2
5	Total Kjehldahl Nitrogen (TKN)	49±6.8	17±1.6
6	Ammonia (NH ₃)	34±4.5	9.6±1.1
7	Sulphide	15±2.2	2±0.5
8	Total Dissolved Solids (TDS)	1174±80	920±45
9	Total Suspended Solids (TSS)	156±56	12±5.6
10	Volatile Suspended Solids (VSS)	112±53.2	1.8±2.2
11	Chloride	42±8.9	41±8
12	Sulphate	36±12.1	26±10.4
13	Oxidation Reduction Potential (ORP) (mV)	+56	+129
14	Bicarbonate alkalinity	200±23	230±25

All the values are expressed in mg/L except pH and ORP

Table S4
Microbial performance of IIPA compound

Organism	Reactor	
	Influent	Effluent
Total coliform	3.1×10^8	1×10^5
Fecal coliform	2.4×10^7	2.9×10^4
Heterotrophic plate count	9.9×10^8	2.4×10^5
Nitrifying bacteria	2.3×10^5	6×10^2
Denitrifying bacteria	2.2×10^4	8.2×10^2
Escherichia coli	1.2×10^7	2.1×10^4
Shigella	12×10^1	3×10^1
Pseudomonas	2.4×10^5	2.0×10^3
Bacillus	3.1×10^4	1.7×10^3
Streptococcus	2.8×10^5	2.8×10^3
Staphylococcus	1.9×10^4	9.2×10^2
Proteaus	1.9×10^4	4.8×10^2

All the values are expressed in (CFU/100 mL)

Table S5 Fluorescence spectral parameters of municipal wastewater and IIPA treated water at different nanometre intervals

Excitation Wavelength (nm)	Emission Peaks	Raw wastewater		IIPA Treated effluent		%Removal intensity
		Emission	Intensity	Emission	Intensity	
240	Peak A	295	155	No peak	-	-
	Peak B	586	52	No peak	-	-
250	Peak A	295	421	296	41	90.26
	Peak B	587	141	587	14	90.07
255	Peak A	295	596	297	67	88.75
	Peak B	587	198	587	26	86.86
260	Peak A	294	688	295	110	84.01
	Peak B	587	228	587	40	82.45
265	Peak A	297	730	297	159	78.21
	Peak B	583	240	590	56	76.66
270	Peak A	296	690	295	189	72.6
	Peak B	588	227	587	63	72.24
275	Peak A	297	744	297	178	76.06
	Peak B	587	246	588	60	75.6
280	Peak A	297	739	297	134	81.86
	Peak B	587	251	No peak	-	-
285	Peak A	297	266	No peak	-	-
	Peak B	571	358	No peak	-	-
290	No peak	-	-	-	-	-